(1) If I have the aequalization ratio of the wrist to the forehead and also of the forehead to the lip, by multiplying the two will I get the same ratio for the sensibility of the wrist to the lip as I would by actual experiment? For the instance just noted this is found to hold, the calculated ratio being 1.4012 and the observed 1.3814. A similar comparison of the wrist, palm, and finger-tip, however, gave a discordant result.

(2) It was found that the sensibility near the median line of a limb or part of the body was very slightly superior to the lateral regions immediately next to it as well as to those farther removed.

(3) On the palm this method, that of the "right and wrong cases," and that of the "just observable difference," were applied to the relative sensibility of the longitudinal to the transverse axis, and all three agreed in making the transverse axis somewhat superior.

Dr. Camerer concludes that the reliability of the method is not clearly made out, and that the assumption of certain constants is necessary to account for the discrepancies to which it leads. An attempt is also made to bring the results into connection with the recent views of Goldscheider, but here again agreement is impossible. The facts must be accepted as such for the present, and their explanation be postponed until more is known of this ever widening field of research. J. J.

Untersuchungen über den Fühlraum der Hand. Erste Mittheilung. Von Dr. J. Loeb. Arch. f. die Ges. Physiol., September, 1887.

With body fixed, all points touchable by the point of the index finger of a freely movable hand and arm are called, in imitation of Hering's optical nomenclature, the *tactile space* of the hand. The rectilinear distance between any two points in this hemispherical space is called the *tactile tract.* The *nuclear point* is, arbitrarily chosen, determined as the point in the median plane (between the tactile spaces of the two hands) where the index fingers meet when the upper arm is adducted and the elbows flexed at right angles. In the first series of experiments a horizontal thread was stretched through the nuclear point, and grasped at that point with thumb and finger of each hand. At a signal both hands moved symmetrically out with closed eyes and as nearly equal rate as possible till halt was called. The distance traversed by each hand was measured in experiments on about 30 persons. Each person was found to have a preferred hand which went always farther than the other, the difference being from one tenth to one half the entire tactile tract, and often with an apparent maximum at 150–200 mm. from the nuclear point, from which the experimenters always tried to keep the distance constantly equal for both hands. If one hand was moved passively, neither the sense nor the constancy of the result was affected, yet the tactile tract of the moved hand was very slightly increased. Knowledge of the constant error he was making on the part of the experimenter had only a temporary effect in correcting it. In hospital patients with unilateral defect the asymmetry was greatly increased. When both hands moved at the same time in the same direction the medial tract was always considerably greater than the lateral, but the over-estimation of the medial tract diminishes very rapidly when one hand passes over into the tactile space of the other. When one tract was marked off and felt, and another to be moved over judged to be equal to it, the reproduced

tract was constantly greater or less in different persons with little reference to the position of the pattern line or its direction. The chief ground of judging the distance traversed by the hand is the time occupied by the motion; to judge differentially of rapidity requires much practice. This appeared in testing Vierordt's statement that a point drawn across the hand seemed smaller the more rapidly it was moved, and by drawing threads and wires with different rapidities between the thumbs and fingers of passive hands. Thus if the duration of the impulse and of the movement is the same, rapidity is generally neglected. Equal volitional impulses give rise to the impression of equal rapidity.

Substantially all these results and others were obtained by a different method, which makes the long discussion that closes this article unnecessary, as long ago as early in 1882, and published in the English quarterly journal, *Mind*, by G. Stanley Hall and E. M. Hartwell, under the title *Bilateral Asymmetry of Function*. These observers also showed that the eyes follow the same asymmetric tendency; that there is a constant error, which was measured, in attempting to bring the index fingers into the position which is designated by Loeb as the nuclear point; that there is a constant asymmetry in reaction time, in maximal clenching movements, etc.

Untersuchungen über die Wärmestrahlung des menschlichen Körpers. Von A. MASJE. Virchow's Archiv, January and February, 1887.

These extended and valuable researches were made in Zürich, and in part under the direction of Prof. H. Eichorst, and embrace the study of heat radiation in both normal and morbid, especially fever, states, but later pathological studies are yet to be described in detail. The formula of Dulong and Petit, that the heat radiating from a body is proportional to the fourth power of its absolute temperature, does not apply to living bodies, which lack a constant constitution internally and superficially. All formulae agree in making radiation decrease with decrease of heat for constant conditions with lifeless bodies, while for the human body, especially in fever where anti-febrile medicines are used, radiation of heat increases as the body cools. All previous studies, from Scharling in 1849 to d'Arsonval in 1885, followed the same method. A naked man was placed in a receptacle in a room of constant temperature, and after a given time the difference of temperature between the receptacle and the room was made the basis of calculation. This, however, does not show the normal, but rather the artificial loss of heat. The method used by Masje was to allow the heat from any exposed part of the body to radiate through a closed card-box, to avoid air movements, upon a fine metallic electric conductor, whereby its resistance is changed proportionally to the elevation of the temperature. Another equilibrating conductor also, of long strips of tin foil on gutta percha, is used, and between the two is a galvanometer. When the two conductors are at constant temperature and a current is allowed to pass through them, the effect of the two can be so exactly balanced by a rheochord that no deviation of the mirror of the galvanometer is observed. But if one is exposed to the radiant heat of the hand, the resulting difference of temperature in the conductors is very accurately recorded by the galvanometer in excursions directly proportional to the heat absorbed by the conductors. By this method the following results were reached. After uncovering